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CALIFORNIA
DEPARTMENT OF FISH AND GAME
601 Locust Street
Redding, California 96001

NATIONAL MARINE FISHERIES SERVICE
650 Capitol Mall, Suite 8-300
Sacramento, California 95814

IN REPLY
REFER TO:

MAY 10 2002

RECEIVED

CALFED Bay-Delta Program

Mr. Dan Ray
CALFED Bay-Delta Program
1416 9th Street, Suite 630
Sacramento, California 95814

Dear Mr. Ray:

Background

On April 11, 2002, CALFED announced its 2002 PSP Selection Panel initial funding recommendations for ecosystem restoration program proposals. In those recommendations, the Selection Panel placed the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project) (Proposal No. 223) in the "Consider as Directed Action in Annual Workplan" category. The Selection Panel recognized the "very important value of the Battle Creek Restoration Project" and requested "an explanation of each of the supplementation needs," "documentation of resolved local concerns," and "dates for the need for supplementation funds." In support of this request, below are clarifications to our 2002 PSP proposal. Further, we have outlined the potential consequences of not receiving funding at this time.

Statement of Multi-Agency Support for Funding Proposal

The signatories to this letter, U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), and Bureau of Reclamation (Reclamation) would like to take this opportunity to express our strong support for the Restoration Project and, specifically, this request for additional funding. We believe the Restoration Project is critical for recovery of endangered and threatened salmon and steelhead species. As described below, securing the requested funds will allow implementation to be

initiated this year on what many consider CALFED's most comprehensive ecosystem investment. Further, the Restoration Project is setting an important precedent for collaborative approaches to achieve higher levels of restoration with our partner Pacific Gas and Electric (PG&E) Company and avoids the normal lengthy and contentious Federal Energy Regulatory Commission (FERC) approval processes.

Clarifications of Supplementation Needs

The Selection Panel expressed concern about the proposal's lack of detail to permit an assessment of the increase in project reliability (expected benefits) in relation to the request for additional funding to cover cost increases from the original funding. The 2002 PSP proposal delineated cost increases and savings for each task as identified in the original 1999 CALFED proposal. Within each task, however, the proposal did not give specific cost increase details, or an explanation of the need for these cost increases. Therefore, we are providing a separate detailed accounting of the cost increases associated with each task, including an explanation of the need. This separate accounting has been delivered to the Fish Screen and Passage Technical Review Team and is also included here as an enclosure.

To fully appreciate the reasons for increased costs, it is important to understand the background leading to the original funding of the Restoration Project. In 1997, the Battle Creek Working Group was formed, and formulation of a restoration project began in earnest. By 1998, biological and engineering studies were initiated to formulate the best possible restoration plan for the watershed. A complete range of structural measures, including fish screens and ladders, dam removals, and modifications to hydropower facilities, were identified as potential components to a restoration plan. Engineering design and cost studies were initiated at a reconnaissance level to allow comparison of alternative measures with biological benefits. When funding CALFED opportunities posed themselves in late 1998, the appraisal level engineering cost estimates were used to submit a proposal to CALFED under the PSP process conducted at that time.

Funding in the amount of $28 million was conditionally approved in February 1999 by CALFED. This conditional approval required the development of a detailed agreement with PG&E Company prior to the release of this funding. The formal execution of a Memorandum of Understanding (MOU) between Reclamation, FWS, NMFS, CDFG, and PG&E Company in June of 1999 met these conditions and funds were released. During MOU negotiations, the PG&E Company sought regulatory assurances from the fishery agencies related to the hydroelectric facilities and their ongoing operation. When it was apparent that such assurances were not feasible, provisions were included in the MOU that called for "fail-safe" fish screens and ladders to ensure reliable operation and function.

Cost increases associated with the Restoration Project are attributable primarily to two factors. First, conservative design philosophies were established at the outset of the implementation process as a result of the "fail-safe" provisions of the MOU. As the implementation process moved forward, a three-point collaborative design philosophy evolved to meet those provisions:

(1) facilities needed to be designed to have a high probability of successfully meeting biological goals; (2) facilities needed to be designed to have a long-term functional reliability, and (3) facilities needed to be designed for ease of operation and maintenance. These three criteria led to conservative designs and higher costs than identified in the appraisal/reconnaissance estimates used to determine the original funding needs. Second, cost increases were identified as a more detailed understanding of site conditions and design parameters occurred. This occurred since no traditional feasibility level design efforts were conducted to more clearly identify site conditions and costs prior to funding of the project. Some of these site conditions are explained in the separate accounting that has been prepared.

The signatories to this letter support the conservative design leading to the identified cost increases as it ensures that the Restoration Project will perform in a manner that best protects and restores the fishery.

Local Concerns

Our four agencies are continuing to work with the Battle Creek Watershed Conservancy (BCWC) in an effort to address and resolve local concerns. Our most recent endeavors focus on instituting a Greater Battle Creek Working Group through the execution of a formal MOU between the various agencies present in the watershed and the BCWC. This MOU is currently undergoing legal review and revisions.

It is hoped that, through this forum, many of the resource issues raised by the BCWC can be addressed. Issues raised by the BCWC are, in some cases, decades-old fishery management issues regarding the operations of Coleman National Fish Hatchery that cannot be resolved overnight. Other BCWC issues relate to landowner concerns about the reintroduction of endangered species to the watershed and the potential impact to their community.

In addition to the work associated with establishing the Greater Battle Creek Working Group, the FWS has also committed, in writing, to reinitiate Section 7 endangered species consultation on Coleman National Fish Hatchery operations upon completion of construction of the Restoration Project. Also, the CDFG is taking the lead, in coordination with the FWS and NMFS, in developing a Fisheries Management Plan for Battle Creek.

Our efforts to coordinate and cooperate with the BCWC will continue. Fishery management issues on Battle Creek have broad implications over the Sacramento River basin and must be addressed in broader forums than the Restoration Project. These issues are complex and cannot be readily resolved. Efforts to resolve these management issues will continue in a broader forum while we continue to work with the BCWC. Specific meetings are being established between representatives of the BCWC, Steve Thompson of the FWS, and representatives of the other agencies.

Dates and Need for Supplementation Funding

Several comments made by the individual reviewers of the proposal express concern that the Restoration Project was not already in place. We can assure you that we have been working hard to implement this complex project. We have established unique processes with FERC to streamline the license amendment process. FERC is a cooperating agency in the preparation of the environmental compliance document. We have been working collaboratively with all of the MOU signatories as well as the State Water Resources Control Board and the Regional Water Quality Control Board to ensure that strong support is maintained for the project. The complexities of the collaborative implementation process that has been followed to date require great effort and committed resources. This has occurred.

We are on the verge of initiating construction on the first of four specifications that are required to efficiently construct this project. This first specification calls for the construction of hydropower water conveyance facility modifications at South and Inskip Powerhouses, construction of the fish screen and ladder features at Inskip Diversion Dam, Coleman Dam removal, and the Soap and Lower Ripley Creek Dam removals.

Specifications 2 and 3 in our proposed schedule cover the removal of Wildcat Diversion Dam (Specification 2) and construction of the screen and ladder facilities on the North Fork (Specification 3). Our current schedule calls for the award of these contracts by March 2003. This award date is critical, especially for Specification 3, as fabrication time is necessary for the screens so they will be ready for installation in the low flow period in the fall. If we cannot meet this time frame, it is likely we will lose a complete construction season as the screens and ladders need to be constructed in the low flow period in the fall. The last specification, Specification 4, for the removal of South Diversion Dam and appurtenant facilities is scheduled for award in late 2003. While this award date is less time-critical, we wish to award to maintain construction management continuity to finish out the project in a timely fashion.

To meet the proposed timeline, our current schedule calls for the release of the public draft NEPA/CEQA document on June 17, 2002, only about 1 month away. By October 25, 2002, we expect to file the final CEQA Findings/Notices and the NEPA Record of Decision. Our current schedule calls for a final FERC determination associated with the FERC hydropower project license amendment that is required to implement this project by November 22, 2002.

Our concern about lack of funding relates to two issues. First, under provisions of the MOU, the Agencies are responsible for acquiring funding for any cost increases associated with their responsibilities, which include the facility modifications and decommissioning work noted above. PG&E Company has expressed serious concerns that full funding of the Agencies' responsibilities is not currently available to complete the project.

The existing FERC license for the hydroelectric project does not expire until the year 2026. The Restoration Project requires an amendment to that license mid-term. Once the draft license amendment is filed with FERC for this project, PG&E Company becomes subject to regulatory

action by FERC, who could enforce completion of the proposed modifications at PG&E Company expense as the Licensee in the event of an Agency funding shortfall. This is contrary to terms that PG&E Company has with the Agencies in the MOU. Hence, PG&E Company, while fully supportive of completing the project and actively working to keep it on schedule, is hesitant to file license amendment applications until such time as all funding of the Agencies' commitments is secured due to the serious exposure it may incur as the Licensee.

Any delay in filing these applications poses delays that will prevent initiation of construction this year. Our concern about lack of funding at this time also relates to the need to obligate funding prior to initiating the procurement of a construction contractor. We feel we currently have sufficient funding to initiate procurement of a construction contract for Specification 1. However, for contracts associated with Specifications 2 and 3, we will need to pre-validate funds this November in order to initiate the procurement actions allowing a contract award in March 2003. In order to ensure that we not delay those specifications, we request that funding be approved at this time.

Thank you for your reconsideration of this important project. If you have any questions related to the strength of the multi-agency support for this project, please feel free to contact any of the signatories below. We would be pleased to provide a more detailed presentation. If you desire such a presentation or have detailed technical questions, please contact the Project Manager, Mr. David Gore, at 916-978-5308 (email dgore@mp.usbr.gov)

Sincerely,

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Enclosure

Preliminary Analysis of Cost Increases Associated with the Battle Creek Salmon and Steelhead Restoration Project

Background

Estimated costs for the proposed Battle Creek Salmon and Steelhead Restoration Project that provided the basis for the conditional funding approved in February 1999 were developed through a series of appraisal/reconnaissance level studies completed between 1998 and early 1999. In February 1999, CALFED conditionally approved these funding levels contingent upon the development of a formal Memorandum of Understanding between PG&E Company, Reclamation, and the various Resource Agencies. In June 1999, a formal agreement (MOU) was entered into between the various parties. The appraisal level cost estimates developed in 1998 and 1999 continued to provide the basis for the proposed funding that was ultimately approved in June 1999. No traditional feasibility design phase was ever completed on the proposed project prior to funding. Design of the project went directly from the recon level to final design.

Through the negotiation process, the MOU included provisions that the screen and ladder facilities that would be incorporated at various sites under the overall plan would be designed to be "fail-safe." A "Fail-Safe Fish Ladder" was defined (MOU, Section 2.10) as meaning "features inherent in the design of the ladder that ensure the structure will continue to operate to facilitate the safe passage if fish under the same performance criteria as designed under anticipated sources of failure." A "Fail-Safe Fish Screen" was defined (MOU, Section 2.11) as meaning "a fish screen that is designed to automatically shut off the water diversion whenever the fish screen fails to meet design or performance criteria until the fish screen is functioning again." As the project moved into the final design phase, these provisions of the MOU were instituted by adopting a 3-point design philosophy that stressed the need to design structural features that (1) had a high probability of successfully meeting biological goals; (2) had a long term functional reliability; and (3) included features that facilitated ease of operation and maintenance activities.

This 3-point design philosophy was also carried through the other features of the proposed Restoration Project. As detailed designs proceeded, this design philosophy led to several modifications to the reconnaissance/appraisal designs used as the basis for funding. These changes have ultimately led to net increased estimated costs to complete the proposed Restoration Project. Some of these changes are outlined below. Cost increases are described in comparison to the tasks as originally outlined in the February 1999 CALFED proposal that formed the basis for the current funding levels.

Task 1. Wildcat Diversion Dam Removal

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Wildcat Diversion Dam Removal	$2,740,000	$1,694,800	$1,045,200

No estimated cost increases are associated with this feature.

Task 2. Eagle Canyon Fish Screen and Ladder

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Fish Screen	$1,950,000	$2,293,100	-$2,112,500
Fish Ladder		$1,769,400	

A description of design changes leading to cost increases follows:

Fish Screen and Ladder Features

Civil Features

1. Fish ladder design flow capacity – Original recon design identified design flow in ladder of 50 cfs. Final design analysis identified design flow of 60 cfs.

2. Fish monitoring – fish monitoring not well defined in Preliminary Design Technical Report (PTR) As a result, extra design work was required to prepare fish monitoring proposals in order to reach a design consensus among project team members. Once a consensus was reached, final designs were prepared.

3. Spring collection system – spring collection system modifications not well defined in PTR. Field trips and meetings were required to document the collection system and prepare an improvement plan.

4. Length of fish screen – length of fish screen was increased to 64 feet to provide adequate screen area to meet required approach velocity.

5. Fish screen hoist – fish screen structure modified to include an overhead support for a hoist.

6. Alignment of fish screen – horizontal alignment of fish screen changed to increase work area of east-end concrete abutment.

7. Fish bypass weir – changed angle of fish bypass weir to allow for better fish passage.

8. Diversion canal weir – weir added in Eagle Canyon diversion canal to regulate water surface elevation across fish screen.

9. Diversion canal water elevation – discovered that the design water surface elevation in the diversion canal was approximately 1 foot higher than that reported in the PTR. As a result, the following changes were incorporated:

10. Added a 12 inch plate above the fish screen

11. Raised the fish screen platform and concrete abutments 12 inches

12. Increased height of dam lip

13. Increased size of slide gate at fish screen intake

Mechanical Features

14. Hoist – a 1 Ton manual hoist was added to install and remove the fish screens. The hoist will convey the screens to a laydown area at the east end of the fish screen structure.

15. Flow control louvers – the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control.

16. Fish screen intake – gate size revised to accommodate a change in water surface elevation at the diversion canal. See civil item above.

17. Fish screen structure – raised structure and appurtenances12 inches to accommodate a change in water surface elevation at the diversion canal. See civil item above.

18. Primary trashrack – added upstream of the main entrance to protect the gates.

19. Secondary trashrack – design was modified when NMFS added more fish passage ports.

20. Hydraulic lubricant – changed from food grade oil to biodegradable oil; required research and numerous discussions with participants to resolve.

Electrical Features

21. System operation logic was developed to meet operational criteria acceptable to PG&E, DFG, NMFS and FWS. Five stage sensors will monitor water levels in the fish ladder and fish screen to ensure minimum instream flow requirements are met and ensure proper operation of the fish passage facility.

A stage sensor will be installed on each side of the fish screen. When the sensors detect a specified differential, the sweeper will be activated to clear any obstructions on the screen. If the differential increases, a warning alert will be sent to PG & E's Manton office and the canal gate will be closed to compensate for the higher level. If the differential gets too high, the canal gate will be closed, an alarm sent, and an on-site reset will be required to resume operation.

22. Stage sensors at the intake gates along the fish ladder and at the diversion will relay water level information to a controller, which will monitor the sensor data and adjust the intake gates and the diversion canal gates to meet minimum instream flow requirements. If flood conditions are detected, all gates will be closed, an alarm sent to the Manton office, and system lock-out initiated. System will require on-site reset after flood condition passes.

23. Programmable Logic Controller (Geomation) and water level sensors will be specified to match existing equipment, as requested by PG&E and agreed at Ladder and Screen technical meetings. These will be sole source items.

24. Fish monitoring - a cabinet was added to house the fish monitoring equipment, and electrical power and conduit were added for the video cameras.

25. Trail lighting – lighting was added along the trail to enable PG&E staff to access the site at night if necessary.

Task 3. North Battle Creek Feeder Diversion Fish Screen and Ladder

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Fish Screen	$1,100,000	$1,568,200	-$1,415,800
Fish Ladder		$489,000	
Access Road		$458,600	

A description of design changes leading to cost modifications follows:

Fish Screen and Ladder Features

Civil Features

1. Ladder design flow capacity- recon level identified a design capacity of 80 cfs. Detailed flow criteria analysis in final design increased design flow of ladder to 110 cfs.

2. Raise left dam abutment – the height of the dam specified in the preliminary design report was not sufficient to protect the facility for a 100-year event. The dam was raised an additional 5 feet and required additional analysis of the dam structure and the adjacent headworks and fish screen structure.

3. Headworks – preliminary design called for the headworks structure to be left as is; in final design, the decision was made to replace it. The new structure will better accommodate the raised dam abutment and fish screen structure. A new structure will also facilitate construction.

4. The electrical and mechanical panels on the existing headworks were relocated. An equipment room was created in the larger and more voluminous headworks structure to

better protect the panels. This change also impacted and required coordination with mechanical and electrical engineers.

5. Fish screen realignment – Fish screen structure alignment was revised to move structure away from right bank, to minimize cuts into the hillside. Excavation of large cobbles and boulders with original alignment might prove difficult and unsafe during construction.

6. Fish ladder walkway – a sturdy, rolling walkway across the ladder was added. After initially pursuing a configuration that would be removable by one person, yet sturdy enough to support 2 persons lifting heavy stoplogs, participants agreed on a heavier, movable walkway that could be left in place over the winter at the downstream end of the ladder, out of the reach of storm flows.

7. Footbridge – a footbridge was added during final design. The bridge will be designed by USBR but additional DWR design time was required to coordinate the bridge location and details with USBR and ensure that the bridge alignment did not interfere with the layout of the fish screen, ladder and headworks structure.

8. Participants also decided to remove screen panels, screen cleaner motors, and other equipment, from the site by raising them onto the footbridge. Designing a cable system and series of hoists to lift the items about 15 feet to the top of the bridge posed a number of logistical problems and required civil/mechanical/electrical time to evaluate alternatives and resolve problems

9. Video monitoring - two alternatives to the camera and light mounting system were discussed with participants and designed to allow NMFS appropriate access to the required bay in the fish ladder. Modifications to the mounting system required changes to drawings and specifications.

10. Sump pipe - after supports and a pipe had already been designed, participants decided to delete the sump pipe altogether.

11. Fish screen structure – at NMFS's request, the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control; this required structural modifications to the steel support structure.

12. Flow straightening vanes were added but were subsequently eliminated when the alignment of the fish screen structure was straightened and moved away from the right bank.

Mechanical Features

13. Headworks – mechanical and electrical panels were relocated to new headworks structure. See civil item above.

14. Hoist and cable rail system – a 1 ton manual hoist was added to install and remove the fish screens and move equipment. Participants subsequently agreed to remove fish screens and other equipment by hoisting up to the new footbridge and a more elaborate hoist and cable rail system was needed to accomplish this. See civil item above.

15. Flow control louvers – the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control.

16. Fish ladder orifice gates – changed from slide gates to custom flap gates, to accommodate concerns from PG&E and NMFS that slide gate handles would bend and that a flap gate with cable actuation would be better.

17. Headworks slide gate - original design called for recycling of the original head gate but during final design, participants decided to replace with new gate because not enough information was available for the old gate. Also, change in headworks design altered the head gate layout.

18. Dam sluice gate – revised design due to changes in sluiceway design and relocation of mechanical panels.

19. Hydraulic lubricant – changed from food grade oil to biodegradable oil; required research and discussion with participants, primarily NMFS, to resolve.

Electrical Features

20. System operation logic was developed to meet operational criteria acceptable to PG&E, DFG, NMFS and FWS. Five stage sensors will monitor water levels in the fish ladder and fish screen to ensure minimum instream flow requirements are met and ensure proper operation of the fish passage facility.

A stage sensor will be installed on each side of the fish screen. When the sensors detect a specified differential, the sweeper will be activated to clear any obstructions on the screen. If the differential increases, a warning alert will be sent to PG & E's Manton office and the canal gate will be closed to compensate for the higher level. If the differential gets too high, the canal gate will be closed, an alarm sent, and an on-site reset will be required to resume operation.

21. Three stage sensors along the fish ladder and at the canal will monitor water levels to ensure minimum instream and ladder flow requirements are met. The controller will monitor sensor data and adjust the intake and canal gates to maintain minimum instream flow requirements. If the canal water level is approaching the canal capacity, the canal gates will throttle to prevent overtopping in the canal.

22. If flood conditions are detected, all gates will be closed, an alarm sent to the Manton office, and system lock-out initiated. System will require on-site reset after flood condition passes.

23. Programmable Logic Controller (Geomation) and water level sensors will be specified to match existing equipment, as requested by PG&E and agreed at Ladder and Screen technical meetings. These will be sole source items.

24. Fish monitoring - a cabinet was added to house the fish monitoring equipment and electrical power and conduit were added for the video cameras.

Task 4. South Diversion Dam Removal

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
South Dam Removal	$ 2,990,000	$2,716,100	$273,900

No estimated cost increases associated with this feature.

Task 5A and B. Inskip Diversion Dam - South Powerhouse Tailrace and Fish Screen (Task 5A) and Fish Ladder (Task 5B)

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Fish Screen	$5,785,000 (Tasks 5A and 5B)	$3,022,5 00	-$6,740,100
South Powerhouse Bypass Tunnel and Tailrace Connector		$7,559,500	
Fish Ladder		$1,943,100	

A description of design changes leading to cost modifications follows:

South Powerhouse Bypass Tunnel and Tailrace Connector

1. Bypass tunnel alignment was shifted slightly to accommodate geologic conditions. This slightly lengthened the tunnel compared to the recon estimates.
2. Access to the Inskip Diversion Dam and associated screen and ladder facilities during the recon phase was estimated to consist of a 2000 foot road, 12 foot wide, with the use of a 40 foot railway flatcar bridge. During final design examination of topography at the Union Canal wasteway and the hydraulics of the flow in this wasteway, it was determined that the railway car configuration would not work because it was too short to safely provide passage for wasteway flows and debris beneath the bridge. Four alternative road concept alignments were examined. Alternative 3 concept was ultimately selected. Three variations of the

Alternative 3 concept were considered to assess ways to minimize visual impacts at stream level for as great as distance as possible) associated with road. Original road assumed to be 12 foot wide. In final design, for safety and drainage reasons, road was widened to 16 feet with an additional 4 feet of width to accommodate drainage ditch and guardrail.

3. Length of double box culvert at peninsula doubled when all features required at peninsula for tailrace connector were considered.
4. Estimated slidegate costs for tunnel inlet portal increased.
5. Need for additional canal wasteway at tunnel outlet portal identified and included in design. Need was identified based on closer examination of tunnel and canal diversion operations. Examinations of operations of the tunnel and canal diversion during outages identified possibility for surcharging canal thereby requiring a new wasteway to prevent uncontrolled overtopping of the canal embankment.
6. Bringing the new road alignment across peninsula required examination of the elevations of the peninsula and the frequency at which floodwaters could potentially overtop peninsula road and prevent access during critical flood periods. Established design criteria that road should be established at 100-year flood elevation. Requires raising of the height of the peninsula.
7. Original design of necked down portion of peninsula was based on a riprap slope protection concept. Raised elevation of peninsula to 100-year flood elevation confined space using original design. Required design change to accommodate near vertical wall (roller compacted concrete).
8. Determined need to include sediment trap in front of tunnel inlet portal and an operation and maintenance access ramp to inlet portal/sediment trap area.
9. New access road determined necessary leading from public road to existing road leading down off of the plateau down to South Powerhouse. Existing access road goes in front of landowners home. Determined that it was appropriate to have construction traffic traveling right in front of landowners home.

Fish Screen and Ladder Features

Civil Features

1. Design Flow - The reconnaissance/appraisal level design used as the basis for the original CALFED funding had a ladder design capacity of up to 80 cfs. Design flow criteria is now based on not allowing more than a three day delay, on average, with a 1:10 year frequency. This resulted in a design flow of 1,700 cfs which translates to a ladder flow design capacity of 170 cfs (including auxiliary water supply). Consideration was given to a design flow of 1000 cfs (100 cfs ladder design flow including auxiliary water supply; i.e., more in line with original design flow). A design flow of 1000 cfs would allow 3-day delays to occur, on average with a 1:3.1 year frequency and a 6-day delay to occur, on average, with a 1:9.3 year frequency. Average daily flows greater than 1700 cfs have occurred 51 times in the 36 period of

record for an average 1.4 days per year (yielding 0.39% exceedance). Average daily flows greater than 1000 cfs have occurred 181 times in the 36 year period of record for an average of 5 days per year (yielding 1.39% exceedance). Given this analysis, the fish screen and ladder design team (including all fishery resource agencies) decided that it was still appropriate to maintain the three-day delay criteria with a 1:10 year frequency (1700 cfs design flow).

2. Fish ladder bridge - A cover over the upper end of the ladder was added to serve as a bridge for vehicle access to the area south of the fish screen. The bridge is 16 feet wide and the clearance between the high weir and the underside of the bridge is 2.5 feet.

3. Upper and lower access roads - A short upper access road, from the fish ladder bridge to the area north of the entrance chamber, was added for maintenance. Where the road crosses the sluiceway, sliding wall panels will be opened to provide vehicles access over the sluiceway floor. A short, unpaved road was also added south of the ladder, between the ladder and the stream, for maintenance access to the entrance chamber.

4. Fish Screen Bypass Channel - The fish screen bypass channel was changed to a 4-foot wide, rectangular concrete channel rather than using the existing canal profile. The addition of the upper access road, and associated grading changes in the area south of the bypass channel, dictated this change.

5. Ladder Structure Drainage - Surface and subsurface drainage within the "C" shaped Fish Ladder Structure, between the bypass channel, the parallel portion of the fish screen and the fish ladder entrance, was changed/added as a result of adding the upper access road (Item 2). Collection ditches were added to collect and direct surface flow. Perforated drainage piping running alongside the bottom exterior of the ladder was added to collect subsurface water and direct it into the creek.

6. Railcar Bridge - A bridge across the canal will be located just downstream of the tilting weir structure to provide vehicle access to the fish ladder and the entrance chamber for maintenance.

7. Parking lot - A paved parking lot was added at the north side of the new facilities, at the terminus of the main access road. The east end of the parking lot was extended to allow access to the instrumentation and intermediate control structure. The parking lot is still 120± feet from the headworks, but a large mobile crane may be able to reach the headworks valves and equipment.

8. Radial gates - A plate was added to the top of each radial gate to prevent fish from falling back over the gate when water is spilling during maximum flow. The steel plate assemblies are oriented vertically and are anchored to the sides of the structures; they are not connected to the gates. A rubber seal is used to block the gap between the gate and the plate while allowing normal gate travel.

9. Fish monitoring - The fish monitoring station was moved from the south to the north side of the canal, adjacent to the tilting weir structure. Conduit and hardware will be installed for mounting and connecting cameras and lights. A slot at the opening of the recess will enable clear plexiglass panels to be removed for cleaning

without dewatering. A white plexiglass panel mounted on the opposite side wall will serve as background for the cameras. The cameras and lights will be purchased and installed separately later, near the end of construction, to take advantage of any technological advances in the equipment. Automated fish counters are not included; they may be installed later if deemed necessary.

10. Ladder sluiceway and drain pipe - Sluice water will be discharged into a 27-inch drainage pipe terminating approximately 70 feet away from the ladder, near South Fork Battle Creek. The pipe will now be able to convey the full ladder flow of 39 cfs so that the flow can be diverted around the entrance chamber for periodic maintenance. The weir downstream of the ladder sluiceway will be revised to accommodate flashboards for when flow must be diverted.

11. Stream Channel Excavation - The excavation across from the entrance chamber, on the south side of the creek, was eliminated. The excavation may be done in the future, if access to the south side is obtained and if hydraulic problems arise that require the excavation.

12. Auxiliary water pipe size - The size of this pipe was increased from 36 to 42 inches to be able to reduce velocity at the diffuser and also extend the service life of the cement mortar-lined pipe.

13. Auxiliary water pipe flow control – The control gate was located at the entrance during preliminary design; however, the pipe does not flow and under certain conditions a hydraulic jump will occur. The control gate was moved to the pipe outlet to ensure the pipe always flows full, eliminating the hydraulic jump.

14. Auxiliary water pipe diffuser - Although the size estimated during preliminary design satisfies published fishery guidelines, at DFG's request, the diffuser size was increased, dissipator "blocks" were added, and the floor was tapered to reduce water velocity through the grating and to make it as uniform as possible. At DFG's request, a steel "false wall" was also added in front of the slide gate, to provide a flush surface for the fish.

15. Entrance chamber - The acute angle at the entrance chamber, near the downstream opening, was eliminated. A transverse wall was added near the downstream opening and the triangular void was replaced with mass concrete. The change, made to eliminate debris accumulating at the corner, also required modifications to the service platform and relocating an access ladder.

16. Entrance chamber - A chamber was added at the southeast corner of the entrance chamber, to minimize flow turbulence. The change required modifications to the service platform and relocating an access ladder.

17. Diversion canal - The invert surface of the transition canal, between the sediment basin and the top of the fish ladder, was raised by one foot to limit the maximum allowable head loss at the headworks gate structure to 1 foot during high flow conditions (a fishery requirement). Other changes required by the slight increase in water surface elevation:

18. Ladder pools - Another pool was added at the top of the fish ladder to provide the necessary incremental drop in water surface elevation along the length of the ladder. The lower weir of this new pool will include flashboards to provide operational flexibility.

19. Screen panels - One more section of fish screen (2 stacked panels) was added to maintain the minimum required wetted area in spite of the reduced water depth. Also, as screen details evolved, the base of the screen begins 4"± above the invert, higher than estimated during preliminary design.

Mechanical Features

20. Hoist – a 1 ton manual hoist was added to install and remove the fish screens. The hoist will convey the screens to a laydown area at the south edge of the parking lot.

21. Swing gate - Swing gate (a custom item) was changed to a slide gate to reduce fabrication costs.

22. Hydraulic lubricant – changed from food grade oil to biodegradable oil, required research and numerous discussions with participants to resolve.

23. Ladder entrance gate operators – changed from manual to auto hydraulic operation so gates could be automated based on water level measured at several locations.

24. Flow control louvers – the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control.

25. Auxiliary water control gate – pipe size changed from 36" to 42" and pipe was moved to the entrance chamber, as noted in Civil notes above.

Electrical Features

26. System operation logic - System operation logic was developed to meet operational criteria acceptable to PG&E, DFG, NMFS and FWS. Seven stage sensors will monitor water levels in the fish ladder and fish screen to ensure minimum instream flow requirements are met and ensure proper operation of the fish passage facility.

27. Fish screen stage sensors - A stage sensor will be installed on each side of the fish screen. When the sensors detect a specified differential, the sweeper will be activated to clear any obstructions on the screen. If the differential increases, a warning alert will be sent to PG & E's Manton office and the canal gate will be closed to compensate for the higher level. If the differential gets too high, the canal gate will be closed, an alarm sent, and an on-site reset will be required to resume operation.

28. Other stage sensors - Five stage sensors at the headworks, along the fish ladder and Inskip Canal will relay water level information to a controller, which will monitor the sensor data and adjust gates at the headworks, auxiliary water pipe and canal to maintain minimum instream flow requirements.

If flood conditions are detected, all gates will be closed, an alarm sent to the Manton office, and system lock-out initiated. System will require on-site reset after flood condition passes.

29. Logic controllers - Programmable Logic Controller (Geomation) and water level sensors will be specified to match existing equipment, as requested by PG&E and agreed at Ladder and Screen technical meetings. These will be sole source items.

30. Monitoring equipment - A cabinet was added to house the fish monitoring equipment.

Task 6A and B. Coleman Diversion Dam - Inskip Powerhouse Tailrace Connector (Task 6A) and Coleman Diversion Dam Removal (Task 6B)

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Inskip Powerhouse Tailrace Connector	$3,220,000 (Tasks 6A and 6B)	$1,601,600	$1,305,100
Coleman Dam Removal		$313`300	

Overall no cost increases associated with these tasks.

Task 7. Coleman Diversion Dam - Inskip Powerhouse Bypass

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Inskip Powerhouse Bypass	$900,000	$5,589,000	-$4,689,000

Reasons for cost increases include:

1. At the time of the original proposal, the nature of this proposed facility was in question because of the complexity of the facility. Eleven different alternative means of achieving the goals of this bypass facility were evaluated. Complex engineering questions arose in the design of this structure. Extensive conceptual design effort went into determining the most feasible means of providing bypass capabilities while meeting biological and reliability goals. Significant hydraulic challenges arose in the design of this feature.
2. Original concept was to develop a relatively inexpensive "natural channel" drainage similar to the existing bypass system along a relatively erosion resistant alignment. Geologic investigations determined that proposed alignments were not erosion resistant thereby making any inexpensive solution infeasible. Led to the selection of a pipeline alternative.
3. Slopes on upper plateau where bypass pipeline alignment was identified are steeper than appear. Hydraulically, velocities of water flowing in the bypass pipe reach on the order of 50 feet per second even before dropping down into the river canyon. Required the development of an energy dissipator on top of the plateau prior to sending the water over the edge of the upper plateau down to the river terrace. Chute conveying bypassed flows down to the river terrace develops velocities approaching 70 feet per second. Requires substantial energy dissipator at the bottom of the slope.
4. Chute bringing bypass flows down into the South Fork Canyon must cross Mt. Lassen Trout Farms water supply line. This water supply line cannot be taken out of service so construction of a bypass for this water supply line must be done without interruption to water supply.

Task 8. Environmental Permitting and Monitoring

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Environmental Permitting and Monitoring	$2,020,000	$3,049,783	-$1,029,783

Reasons for cost increases:

1. The cost of preparation of the NEPA/CEQA document done through a contractor was more expensive than anticipated. Increased time and effort was required to coordinate with the private consultant to complete preparation of the

NEPA/CEQA document. Issues not anticipated that needed to be addressed but were not anticipated included: (1) issues associated with potential introduction of IHN and other diseases as a result of reintroduction of salmonids into watershed and potential effect on private trout hatcheries; (2) development of much expanded related projects section in the environmental compliance documents to address fishery management issues at Coleman Hatchery and other issues raised by local Battle Creek watershed Conservancy; (3) Increased number of biological surveys required than anticipated for raptor and bat surveys.

2. More coordination time was spent between the environmental compliance team and the engineering team to avoid impacts as much as possible in the design of the project.
3. No costs associated with biological monitoring of mitigation implementation were included in original proposal.
4. Cost increases not specifically related to Task 8 but spread throughout Tasks 1 through 7 are related to mitigations costs. In the original proposal, a 3 percent factor was applied to appraisal level cost estimates to identify an amount of mitigation costs. Actual mitigation costs will be higher than that.

Task 9. Project Management

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Project Management	$1,116,000	$800,000	$316,000

No cost increases were identified for this Task. However, engineering and design costs for Tasks 1 through 7 were higher than anticipated. These cost increases are included in each of the cost increases shown for Tasks 1 through 7 above, but are discussed here as a more general discussion.

Much of increased final design costs are attributable to the fact that design efforts went directly from appraisal level to final design. More time and effort was spent early on in final design concept phases to evaluate conditions that normally would have been done in planning phases in a more traditional process. The number of alternatives looked at for the Inskip Powerhouse Bypass facilities and the number of alternative access roads at the South Powerhouse site are indicative of this type of cost increase. This comment is not a criticism of the process used, only a comment that engineering costs as a percentage of

construction costs appear high because they include costs that would more traditionally have been considered project planning costs.

In addition, engineering and design were carried out in a collaborative manner. PG&E Company, CDFG, NMFS, and FWS all participated in the engineering/design process. Multiple design team meetings were held where specific design details and approaches were discussed in great detail. In many cases, this led to consideration of multiple design variations for various sub-features associated with facilities at each site.

In many cases, design data costs were higher than anticipated. For example, to acquire geologic data for the South Powerhouse Bypass Tunnel drill rigs had to be helicoptered to drill hole locations. Extensive time was also spent mapping trees at the Inskip Diversion Dam/South Powerhouse and Coleman Diversion Dam/Inskip Powerhouse sites to allow designs that avoided impacts as much as possible. More design data was required related to addressing design issues associated with the Mount Lassen Trout Farms water supply line. More geologic design data was required when the decision was made to develop the proposed North Battle Creek Feeder Access Road versus doing all helicopter work at this site. More geologic investigations associated with rock fall potential at the Eagle Canyon and Wildcat sites was required to assess potential safety hazards during construction at these sites.